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PROCEEDINGS
OF
THE ROYAL SOCIETY.

December 5, 1850.

LIEUT.-COLONEL SABINE, R.A., V.P. & Treas. in the Chair.

A paper was read, entitled "Researches into the Structure of the Spinal Cord." By Jacob Lockhart Clarke, Esq. Communicated by Samuel Solly, Esq., F.R.S. Received October 15, 1850.

The author having undertaken a series of observations with the view of determining, if possible, the relations which appear to subsist between the spinal nerves and the respiratory nervous centres, was led into a more extended inquiry than he at first contemplated, the results of which are communicated in this paper. After stating that the observations were made, by means of a microscope of the best construction, upon many thousand preparations of the spinal cord of Man, of the Calf, Sheep, Pig, Dog, Cat, Rabbit, Guinea-pig and Frog, he describes the methods adopted in making these preparations. The following are the results of his observations.

At the lower extremity of the spinal cord, the posterior gray substance consists of a single mass, formed by the coalescence of the two posterior horns, and consequently the gelatinous substance extends across the middle line. The anterior gray substance, however, is divided by the anterior columns into two distinct horns, which curve inwards and taper to a rounded point. The spinal canal is large and nearer the anterior surface of the cord.

The nerve-vesicles are scattered irregularly through the gray substance.

The fibres of the gray substance are of the tubular kind, and of small average diameter. There are two classes with regard to direction, transverse and longitudinal. Of the transverse, there are two orders, the antero-posterior and latero-transverse.

The antero-posterior are continuous with the posterior roots of the

nerves, and probably with the anterior roots. The latero-transverse stretch between the opposite sides of the gray substance, forming its transverse commissure.

Longitudinal Fibres.—Those of the gelatinous substance, have the characters of minute tubular fibres, presenting dark outlines and frequent varicosities. Their average diameter is the $\frac{1}{12,000}$ th of an inch. They have no nuclei as generally stated, and have no resemblance to the sympathetic fibres or caudate processes. These fibres are found through the rest of the gray substance, but in smaller numbers; immediately below the gelatinous substance, however, they form a remarkably dense band.

Changes in the form of the gray substance are observed on examining the cord from below upwards. The posterior mass is gradually divided into two, and the gelatinous substance is interrupted in the middle line. Two vesicular masses gradually appear at the sides of the spinal canal, traversed by fibres from the posterior nerves, and from the transverse commissure. The anterior horns also undergo certain changes, become club-shaped in the lumbar region, and contain large groups of caudate vesicles. In the middle of the dorsal region the posterior horns have again coalesced, and the gelatinous substance again crosses the middle line. The anterior horns are straight and narrow, and their vesicles are scattered through them irregularly. In the cervical enlargement the posterior gray substance has become again divided to its greatest extent into two horns, and the gelatinous substance is again interrupted in the middle. The two vesicular masses from the sides of the spinal canal are here, as in the lumbar enlargement, included in the posterior horns. Here also, and in the lumbar enlargement, the anterior horns are nearly similar in appearance.

The nucleus of vesicular substance, in which the spinal accessory nerve may be seen to arise, has been traced by the author as low down in the cord as the upper part of the lumbar enlargement.

The grayish structure immediately surrounding the spinal canal, consists chiefly of fibro-cellular tissue, and is not to be regarded as a commissure, as maintained by Stilling and Foville. The spinal canal, as stated by the former observer, extends through the whole length of the cord.

The vesicles of the cord are found chiefly in the anterior horns, as usually stated, but occur also in the dark masses situated in the dorsal region at the sides of the spinal canal; and also more sparingly in the posterior horns as far as the gelatinous substance. The author has never been able to make out satisfactorily in mammalia, any connection between the nerve-vesicles and the tubular nerves, nor between the latter and the caudate processes.

The blood-vessels of the cord enter through the anterior and posterior median fissures, through the smaller fissures in the white columns, and at the roots of the nerves. They form a beautiful network of loops along the whole periphery of the gray substance.

Of the White Columns of the Cord.—The anterior columns have no proper transverse commissural fibres, but are crossed horizontally

but chiefly obliquely, by tubular nerve-fibres and blood-vessels, which proceed from the gray substance on each side and decussate in front of the spinal canal: nor are the posterior white columns connected by any commissural fibres, the posterior fissure reaching down to the gray substance.

Origin of the Spinal Nerves.—The posterior roots are attached exclusively to the posterior columns. Their fibrils generally are finer than those of the anterior roots. The anterior roots are attached to the anterior parts of the antero-lateral columns, which they traverse horizontally in straight bundles, till they reach the anterior horns, in which they break up and form a complicated network. The author has not yet been able to determine whether any of the fibres of the spinal nerves ascend with the longitudinal white columns.

December 12, 1850.

SIR FREDERICK POLLOCK, Lord Chief Baron, V.P., in
the Chair.

The following letter from M. Arago to Lieut.-Col. Sabine was read, and ordered to be entered on the Minutes.

“Paris, Dec. 8, 1850.

“MON CHER MONSIEUR,—Mon age, ma mauvaise santé, l'état déplorable de mes yeux, et la part que j'ai dû prendre aux évènements dont mon pays a été le théâtre depuis le 24 Février 1848, m'avaient fait supposer que j'étais entre dans cette période de la vie où rien ne peut produire une vive impression. Votre lettre ma détrompé. La nouvelle que la Société Royale avait bien voulu m'accorder pour 1849 et 1850 la médaille de Rumford m'a comblé de joie. Veuillez être auprès de vos honorables confrères l'interprète de mon inaltérable reconnaissance; dites leur surtout, que leur indulgence me fera redoubler d'efforts pour que les travaux qui me restent à publier ne soient pas indignes de la faveur dont j'ai été l'objet.

“Agréez, mon cher Sabine, l'expression de tous mes sentiments.

“F. ARAGO.”

A paper was then read, entitled, “On the Action of Nitric Acid on various Vegetables, with a more particular examination of *Spartium scoparium*, Linn., or Common Broom.” By John Stenhouse, Esq., F.R.S. Received November 18, 1850.

This paper is a continuation of a series of investigations intended to elucidate the nature of vegetables by means of chemical reagents. A preceding paper contained an account of the effects produced by the action of sulphuric and hydrochloric acids on the *matière incrustante* of several plants belonging to different great classes of vegetables. The effects of nitric acid upon a variety of vegetable groups are now described; the researches having been undertaken in the hope that by means of this powerful reagent some light might perhaps be thrown on peculiarities in their respective constitutions.